Technical Note: debt-to-income (DTI) ratio new commitments survey

Introduction

The Reserve Bank of New Zealand is publishing data from the monthly 'DTI new commitments survey' as a quarterly release, from 12 August 2019.

This technical note will:

- Assist interpretation of data, including the definitions of terms used (section 2).
- Discuss the data quality issues that were encountered in the development of the survey and how the Reserve Bank responded (section 3).
- Demonstrate the potential uses of the data, such as analysing trends in housing affordability and financial stability risks (section 4).

The Reserve Bank developed the DTI survey to better understand risks to financial stability. We collect data on the value and number of new mortgage commitments, total borrower debt, and borrower gross income. The DTI ratio is calculated by dividing a borrower's total debt by their gross income.

The Reserve Bank views the DTI ratio as a reliable measure of mortgage serviceability for owner-occupiers. All else equal, a borrower with a lower DTI ratio would have a larger buffer to withstand adverse shock to their serviceability, for example a partial loss of income or higher interest rates. Higher serviceability risk increases the likelihood of credit losses for banks in a downturn.

The DTI survey is part of a larger dataset that provides insights into the risk of new mortgage lending. From August 2013, the loan-to-value ratio (LVR) survey collates the LVR of new mortgages, which is a measure of the credit loss to banks in the event the borrower cannot service their debt. The DTI and the LVR data are complements in the assessment of financial stability risks.

The Reserve Bank began collecting the DTI data from October 2016. We have used high-level DTI data as a resource in the six-monthly *Financial*

Stability Report (FSR),[1] but have not published the data due to quality concerns. We have worked closely with banks to address these concerns and will now publish monthly aggregated data as a time series from June 2017.

The Reserve Bank supports the principle of ‘open data’ for anyone to access, share, and use. Data should be trusted, authoritative, well-managed, and readily available. We expect the published DTI data to have benefits for users across government, financial institutions, the private sector (including data suppliers), and the general public.

Consultation with stakeholders suggests that the DTI survey can assist individual lenders in their internal risk management, by providing an industry average of the DTI distribution for comparison. Some stakeholders in the policy area indicated the DTI data can play a helpful role in assessing housing affordability for new home buyers.

2 Interpreting DTI data

This section outlines the scope of DTI data we collect and publish, including key definitions used in the published DTI survey and throughout this user guide. The definition used in this technical note are based on the data collection guidelines for the DTI survey (RBNZ, 2016).

DTI new commitments survey (DTI survey)

The DTI new commitments survey is a monthly survey completed by registered banks. The published survey includes the value and the number of new mortgage loans to owner occupiers, split by DTI ‘buckets’, the income of borrowers, whether the borrower lives in Auckland, and whether they are a first home buyer.

The published DTI data covers new commitments to owner occupier borrowers only. The DTI survey also collects property investor data, but we are not publishing this data. DTIs are a less useful metric for property investor serviceability risks, particularly for major investors with large property portfolios. Moreover, the data quality of DTI data for investors is lower (see section 3).

New commitments

Committed lending in the DTI survey is a finalised offer to customers to provide a mortgage loan, or to increase the loan value of an existing mortgage loan. A bank enters into a new commitment for a residential mortgage loan when the bank sends the loan documentation to the applicant’s solicitor. This is typically the day the bank made an irrevocable offer to an applicant for a mortgage loan and the borrower accepted the offer. Commitments do not include pre-approvals that may or may not lead to a firm offer of finance. Necessary (but not sufficient) conditions for a new commitment are that a specific property has been identified and a loan amount has been agreed that the customer will draw down, or in the case of a mortgage facility, for the facility limit.

1 See https://www.rbnz.govt.nz/financial-stability/financial-stability-report.

Loan to income ratio (LTI)

Loan-to-income ratio = [loan value at own bank / total gross income]

Loan value

The loan value is amount being borrowed for the mortgage. This will normally include all mortgage debt at your bank.

Debt to income ratio (DTI)

Debt-to-income ratio = [total balance of borrower debts / total borrower gross income]

Borrower debt

The total balance of loan values is the sum of all loan values (or the facility limit of a revolving loan line) that the borrower or borrowing parties are responsible for servicing out of their income. This includes the loan value of the new commitment, and any pre-existing mortgages, including other lenders. Where possible, this incorporates any other loans that are considered in the bank's serviceability assessment (e.g. consumer, credit card and overdraft lines, student loans for some banks,[2] and other loans and leases). The loan amounts can be provided by borrower disclosure or via third party data credit bureaus. Foreign debt should be included as disclosed.

2 Banks tend to treat student loans as a deduction from income, in which case they are excluded from total debt. However, the treatment is not uniformly consistent across all banks, and in cases where a bank considers student loan to be part of total debt instead of a deduction from the income, it will also be counted in the DTI.

Borrower gross income (BGI)

Borrower gross income is the amount of income the reporting bank is prepared to count as part of assessing whether to extend a loan to a prospective borrower (i.e. that qualifies after any applicable haircuts based on the lender's internal lending policy). Haircuts to certain incomes are used to reflect uncertainty and unavoidable expenses related to earning that income. Haircuts are made in line with each bank's serviceability policy, with the exception of a 25 percent haircut for all rental income prescribed by the Reserve Bank for the purpose of data reporting.

Borrower gross income includes:

- Wages and salaries
- Self-employment income
- Boarder income
- Rental income
- Superannuation & other government benefits
- Investment income.

First home buyers (FHB)

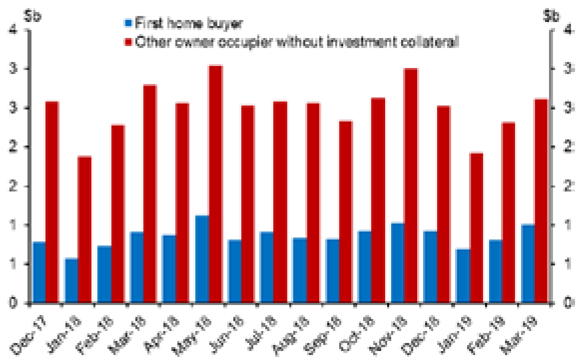
A first home buyer is a borrower entering home ownership in New Zealand for the first time, and purchasing or building a property they (or a related party) intend to owner-occupy. If there is more than one borrowing party to a loan, borrowers are classified as first home buyers only if none of the borrowing parties have previously drawn down on housing finance for owner occupation. The borrower declares whether they are a first home buyer as part of the loan application.

Other owner occupier without investment collateral

Other owner occupiers without investment collateral are borrowers who own or are in the process of buying or building a house or flat they (or a related party) will live in, or are borrowing against properties that meet that definition, are not first home buyers, and are not borrowing against any investment properties. An owner occupier can occupy more than one property, e.g. a family home and a holiday home.

The value of new commitments to other owner occupiers without investment collateral has typically been around three times as large as commitments to FHBs over the past two years (figure 1).

Figure 1
New commitments to FHBs and other owner occupier without investment collateral



Owner occupier

Owner occupiers are all borrowers who are not borrowing against any investment properties. Owner occupiers include both first home buyers and other owner occupiers without investment collateral. An owner occupier can occupy more than one property e.g. a family home and a holiday home.

This definition of owner occupier is based entirely on the nature of the borrowers' collateral pool (whether it contains investment property). This definition is conceptually and statistically different from the borrower types defined by the purpose of the mortgage in the C31 Statistical series.

Auckland loan and Non-Auckland loan

A loan is an Auckland loan if it has any Auckland owner occupied property as collateral. A loan is a Non-Auckland loan if it does not have an Auckland collateral. Auckland is the only region to be captured in the survey, so other regional data is unavailable.

3 Methodological challenges and Reserve Bank response

The Reserve Bank has worked with banks to substantially improve the quality of the DTI new commitments survey since October 2016, when the data began.[3]

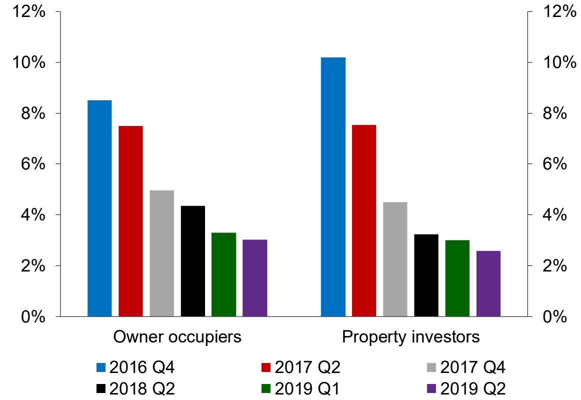
Early in the collection, there were several methodological challenges to data quality:

- Banks were generally not collecting all the material income of borrowers that are eligible in their mortgage serviceability tests. Many banks were only collecting income up to the point where mortgage serviceability requirements were met.
- Some banks were unable to accurately report their DTI data because of limitations in their systems and processes, leading to a significant share of lending reported as 'DTI unknown'.

The Reserve Bank has been in discussion with the reporting banks about how to address these measurement issues. In June 2017, the Reserve Bank sent a letter to the reporting banks requesting them to improve the quality of the DTI data, by investing in the resources necessary for accurate data collection, and capturing all material borrower incomes.

3 A more experimental DTI data series is available internally to the Reserve Bank for the period from June 2014 to April 2017, and has been reported from time to time in the *Financial Stability Report* and elsewhere. This series was discontinued in favour of the DTI new commitments survey, which covered the DTI data with greater granularity and reliability.

Figure 2
Share of mortgage lending with unreasonably high DTIs, Oct 2016 to June 2019



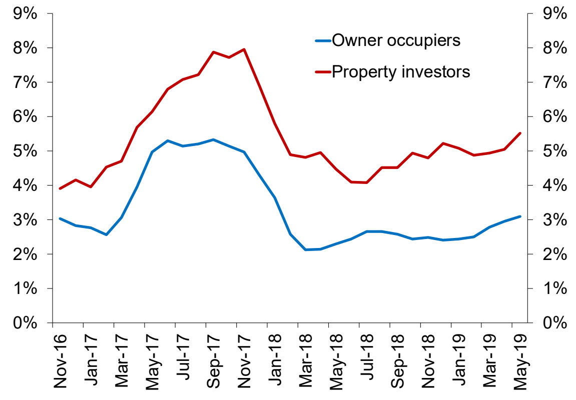
An internal review by the Reserve Bank in early 2018 found that the data quality of the DTI survey had improved in the second half of 2017, to a level suitable for analytical purposes. We found that the share of new mortgage values associated with an unreasonably high DTI,[4] relative to the income of the borrower, had declined (figure 2), reflecting a more comprehensive collection of borrower incomes by banks. We have also observed a decline in the share of owner occupier lending reported as 'DTI unknown' (figure 3),[5] reflecting the effort by banks to improve their loan origination processes. The improvement in data quality after early 2017 underpins our decision to publish the DTI survey from June 2017.

There remains a small volume of mortgage lending being reported as having very high DTIs. Our discussions with reporting banks suggest that most of these atypical borrowers are seeking bridging finance or are legal

4 Unreasonable mortgage commitments are defined as loans that, if measured accurately, could not have been approved if the decision to approve the loan was based strictly on banks' serviceability tests, given what we know about origination standards. These mortgages are not necessarily unserviceable even if measured correctly, given that current mortgage rates are much lower than the assessment interest rates typically used by banks.

5 Note that data presented in figures 2 and 3 are not part of the DTI publication.

Figure 3
Share of DTI unknown mortgage lending
(3-month average)



entities, such as trusts and look-through companies.[6] Our understanding is that property investors are over-represented in these special cases of very high DTI lending. These special cases make the interpretation of investor DTIs difficult in terms of serviceability risks. There is also a larger share of DTI unknown lending for property investors (figure 3), pointing to some residual data quality issues. In contrast, owner occupier data tends to be more easily interpreted and more reliable. This supports our decision to exclude the property investor data from the DTI publication.

In response to our proposals to publish the DTI survey, some stakeholders raised concerns that the comparison of the DTI distribution between individual financial institutions and the published industry aggregate could be distorted by:

- differences in the income haircuts used by individual institutions, and

- differences in their treatment of business debts.

We responded to the first concern by analysing the differences in the haircuts banks apply (for example, to boarder incomes, financial investment incomes, and irregular forms of incomes). These haircuts determine the income levels that are eligible for mortgage serviceability tests, but also for the measurement of borrower DTIs. We found that given our information on banks' haircut and on the income composition of new mortgage borrowers, even the most extreme of the haircut regimes would not materially impact on the reported DTI distribution relative to the industry average.

The second concern fell away upon further discussions with industry. These discussions clarified that the treatment of business debts is mostly aligned across the banking industry, with small differences that do not have a noticeable impact on the reported data.

All told, discrepancies in the way banks measure borrower DTIs should not significantly impact the comparison of the DTI distribution with the industry aggregate. These differences could heavily impact on the DTI measurement for an individual borrower, but should not be material in a portfolio-level comparison.

Lastly, differences in how banks measure borrower DTIs should not affect the use of the data in monitoring system-wide risks, unless measurement of the data changes substantially. This reinforces our view that the DTI survey is of a sufficient quality to be used by stakeholders for a range of purposes.

6 For example, in the case of a partial guarantee of the debt of a look-through company (LTC) by its owners, the LTC can be recorded as a separate borrower with its own DTI under our guidelines. Naturally, a LTC does not incur 'living expenses', and would be able to service a much higher DTI than a borrower composed of natural persons.

4 Potential uses of the data

Data from the DTI new commitments survey could be used for a wide range of purposes. This section provides use cases for analysing:

1. financial stability risks
2. trends in housing affordability
3. internal risk management of individual institutions.

Financial stability risks

The DTI relates the size of a borrower's debt to their capacity to service it, and correlates with their ability to endure adverse shocks to serviceability (RBNZ, 2017). Therefore, the share of system-wide lending with a relatively high DTI is indicative of aggregate vulnerability of mortgage lending (although DTIs are less useful for assessing the risk of individual loans, which need to account for their idiosyncratic characteristics).

DTIs are also indicative of the negative feedback on the economy from serviceability shocks. Under an adverse shock, borrowers with a higher DTI would tend to reduce their consumption, which would worsen an economic downturn. Thornley (2016) summarises the international evidence showing that high-DTI households tend to reduce their consumption sharply in response to shocks.

Serviceability risks should be viewed as a continuum, and any hard threshold for identifying high-DTI lending is arbitrary. However, overseas regulators who have used a loan-to-income (LTI) restriction have applied

Box

How RBNZ calculates residual income for first home buyers

To calculate the average residual income of FHBs, we:

- obtain the average mortgage debt and income for FHBs by dividing the total value of new mortgages and borrower income by the number of new mortgages. As the survey does not include the income of new Auckland buyers, we assume that Auckland FHB incomes are the same as the national average (in reality they are probably higher).

- use the average mortgage debt and interest rate to calculate the minimum payment on a 30 year mortgage. The interest rate data are sourced from the Reserve Bank's B6 statistical series, although the analysis can be done for any interest rate. The assumption of a 30-year term is reasonable if we believe most borrowers can restructure their loan to 30 years.

- subtract our estimate of the minimum payments from the average income to obtain the average residual income.[1]

1 We do not have data on the effective income tax rate for FHBs. We assume a tax rate of 25 percent, which is roughly the PAYE that would prevail, if the average income is attributed equally to two earners in a household.

Figure 4
High-DTI (DTI>5) shares of owner occupier new commitments
(values)

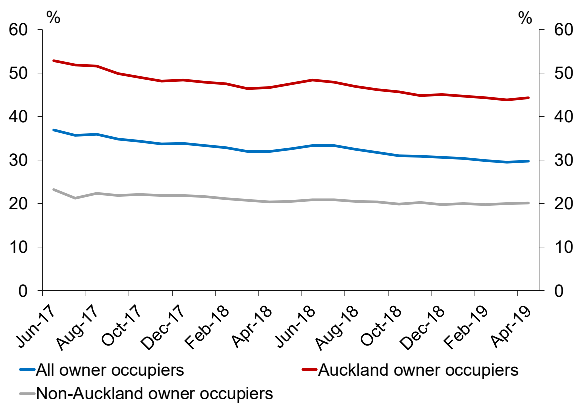
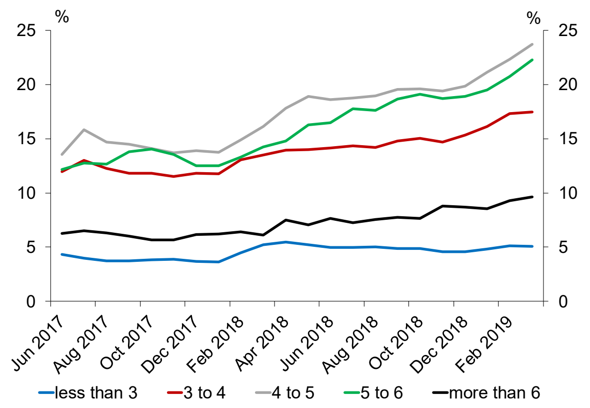


Figure 5
Share of each DTI bucket with an LVR above 80
(values)



limits of up to five for owner occupiers.[7] For example, Ireland and the UK have LTI limits of 3.5 and 4.5, respectively. The difference in the regulatory thresholds in the two countries reflects differences in the risk environments, risk appetite and historical experience. The Reserve Bank's risk monitoring keeps a particularly close watch on new mortgage lending with a DTI of above five.

The nationwide share of new commitments to owner occupiers with a DTI of above five has declined from 37 percent in June 2017 to 30 percent in April 2019 (figure 4). The decline was driven primarily by a reduction in the volume of high-DTI Auckland lending, although the share of high-DTI lending in Auckland continues to be much higher than the national average.

The Reserve Bank has DTI data dated to 2014 from a previous survey, which showed a more entrenched decline in the share of new mortgage lending with a DTI of above five over the four years, for both owner occupiers and property investors. This development has been highlighted in the FSR and other publications.

Serviceability risk is only one factor in determining credit risk in the banking system. The other factor is the potential loss to banks if borrowers are unable to service their debts, which is better captured by the LVR. We are particularly concerned with new mortgage lending associated with high serviceability risks *and* high credit losses given non-serviceability, which is captured by a high LVR.[8]

The DTI survey shows that new lending with a DTI of above six is less likely to be associated with a high LVR, than mortgages with a DTI of between three and six (Figure 5). This suggests that, for borrowers with high serviceability risks (DTI above six), the loss given non-serviceability remains low. However, the share of borrowers with a high-LVR has

7 LTIs are conceptually similar to DTIs, but may not include a borrower's debt that are held outside the bank. We can expect the DTI distribution of the mortgage portfolio to be somewhat higher than the LTI distribution.

8 The Reserve Bank's LVR restrictions currently specify a high-LVR threshold of 80 percent for owner occupiers.

Figure 6
DTI distribution of first home buyers
(number of buyers)

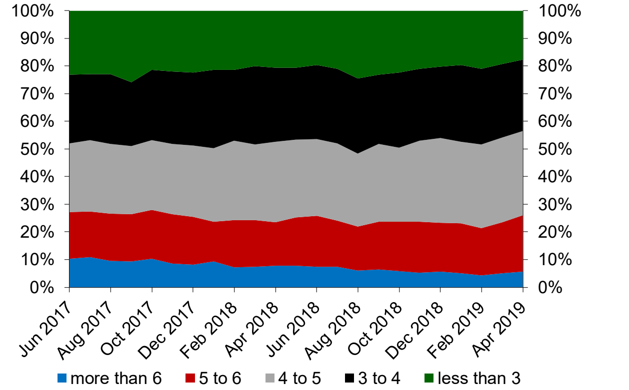
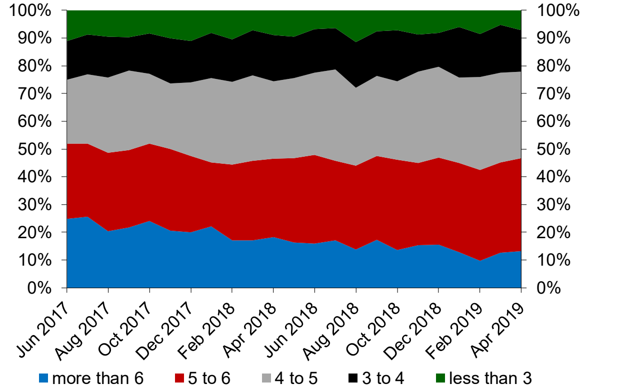


Figure 7
DTI distribution of Auckland first home buyers
(number of buyers)



increased for more moderate DTIs of between 4 and 6, perhaps due to the easing of the Reserve Bank's LVR policy.

In summary, the DTI new commitments survey suggests that the serviceability risk of new owner occupier borrowers has eased since the middle of 2017. That said, our purpose is to highlight the analytical potential of the DTI survey.

One measure of housing affordability

Housing affordability can be viewed from several perspectives: the affordability for renters, affordability for prospective home buyers, and affordability for recent home buyers (Hallinan *et al*., 2006). The DTI survey is more suitable as tool for assessing recent home buyer affordability, because it measures actual mortgage lending flows.

The DTI distribution of first home buyers is a high level indicator of affordability, as it shows the debt levels needed to purchase housing for a new entrant (figures 6 and 7). There has been no major change in the nationwide share of lending with a relatively high DTI (above 5) over recent years. However, this hides the impact of changes in interest rates and buyer incomes.

Residual income is a more sophisticated measure, capturing the income left for a household after meeting their mortgage obligations. The residual income is similar to the housing affordability measure of the Ministry of Business, Innovation and Employment (MBIE, 2017). The following box explains how we estimate the residual income of FHB borrowers using the DTI data.

The resulting series shows that FHB affordability has remained stable on average after a decline in late 2017, at an average residual income of around $68,000 per annum (figure 8). Our estimate of housing affordability in Auckland is significantly lower than the national average (figure 9). However, policymakers may be more concerned with housing affordability for the more indebted tail of new FHBs. Because the data are split by DTI buckets, we can approximate the residual income for the more indebted tail: for example, the top half and the upper quartile of new

Figure 8
Residual income, nationwide FHBs

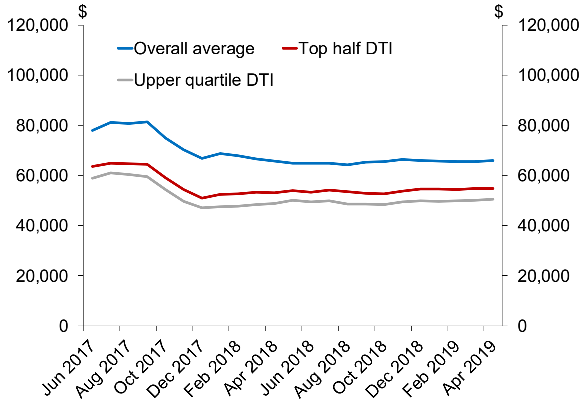
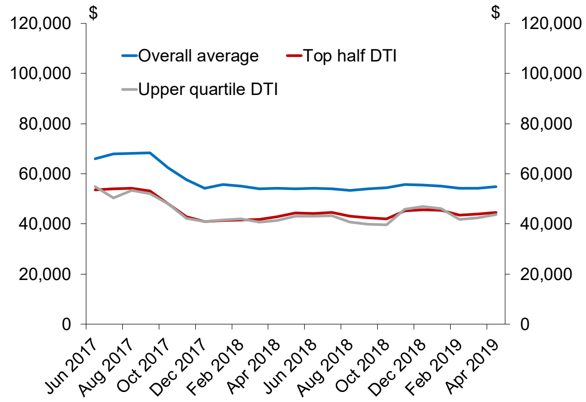


Figure 9
Residual income, Auckland FHBs



FHBs.[9] This analysis suggests affordability for the more indebted tail of buyers is significantly lower than the overall average (figure 8 and 9).

The measures of housing affordability shown in figures 8 and 9 do not account for the basic expenditure of buyers on non-mortgage purposes. Dunstan and Skilling (2015) estimated the essential expense for households using the Household Economic Survey. Based on their estimates, our residual income for Auckland FHBs in the top half of the DTI distribution implies that they are spending approximately all of their residual incomes on essential expenses, pointing to low housing affordability for new Auckland FHBs.

Internal risk assessment

The DTI data may also be useful for the internal risk management of individual financial institutions. Banks and other mortgage lenders will want to understand how prudent their mortgage origination is relative to that of their competitors. Lenders may also want to know whether the mortgage deal they are offering to their customers is competitive. Lastly, lenders may wish to understand how the lending appetite of the industry is responding to any regulatory changes.

A simple method of comparing credit risks at the institution level with the industry aggregate is to monitor the share of new lending with a DTI of greater than five, and the share with both a DTI of greater than five and a LVR of higher than 80. Figure 10 shows how a hypothetical bank could use this information to monitor their mortgage portfolio risk. The figure

9 For example, let us assume that in the upper quartile of the DTI distribution, 40 percent of borrowers have a DTI over 6, 40 percent of borrowers have a DTI of 5 to 6, and 20 percent have a DTI of 4 to 5. The estimated residual income for the upper quartile would be a weighted average of the residual income of these buckets, with a weighting of 0.4 for the DTI>6 bucket, 0.4 for the DTI 5 to 6 bucket, and 0.2 for the DTI 4 to 5 bucket.

Figure 10
High risk lending, hypothetical bank vs. aggregate
(three month to March average)

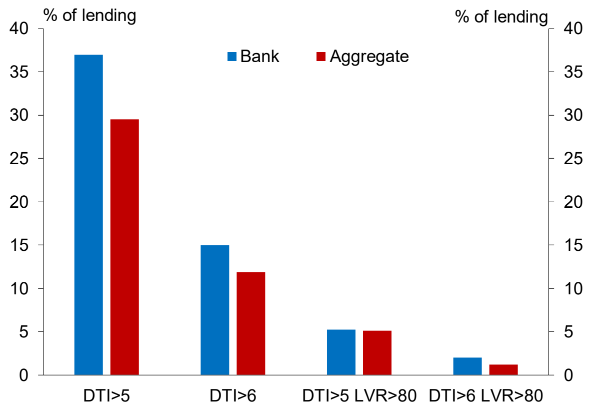
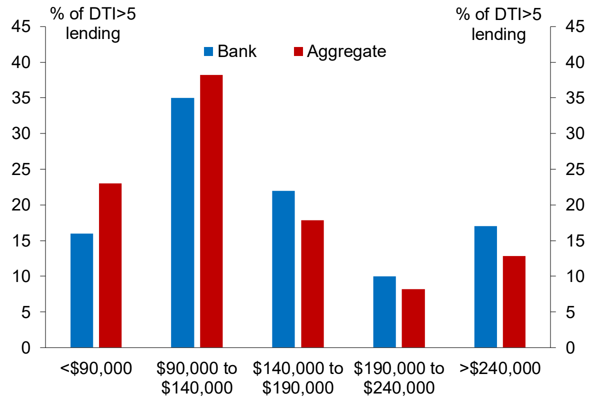


Figure 11
Borrower income range of high-DTI lending, hypothetical bank vs. aggregate
(three month to March average)



shows that the share of recent lending the bank has made at a high DTI is greater than the industry average.[10]

Our DTI survey includes the borrower income distribution of high-DTI lending, which allows for a more accurate interpretation of the risk for an individual bank. Figure 11 shows that the borrower incomes associated with the high-DTI lending by the hypothetical bank are higher than the industry average. This suggests that the bank is, in risk management terms, compensating for its high-DTI mortgage lending with more stringent serviceability requirements in terms of borrower incomes.

10 In practice, when interpreting the comparison of the DTI distribution with the industry aggregate, banks should also consider their own appetite for bridging finance relative to peers.

Conclusion

The DTI new commitments survey has come a long way since the collection started in October 2016, and is suitable for a range of analytical purposes. The Reserve Bank and the reporting banks have worked collaboratively to improve the measurement of the DTI survey, leading to a substantial improvement in data quality and consistency over time, particularly for owner occupier lending.

We have demonstrated a number of simple techniques for using the DTI survey to monitor financial stability risks to the banking system and the broader economy, and to assess recent developments in housing affordability. We have also shown that the data can be used as an industry benchmark to assess the credit risk associated with the mortgage lending of individual institutions.

Further additions to the DTI publications will be considered mainly on the basis of data quality and regulatory requirements. Property investor data could be considered, if we are confident that data quality has reached a satisfactory level.

As previously stated, the Reserve Bank views that a serviceability restriction, which would limit the proportion of new mortgage lending made at above a certain DTI, to be a useful addition to its macroprudential toolkit (RBNZ, 2017).[11] Phase 2 of the review of the Reserve Bank of New Zealand Act will consider the macroprudential toolkit, including whether a DTI-based serviceability tool is appropriate. While the DTI survey was developed to better understand risks to financial stability, it would also be useful for monitoring regulatory compliance in the event that a DTI tool was available and subsequently introduced.

The other avenue to build on the DTI publication could be to publish individual banks' DTI position in the Bank Financial Strength Dashboard. To do this, we would need to have confidence that the DTI distributions of individual banks are broadly comparable with each other, in addition to the aggregate DTI distribution. Any potential additions to the Dashboard would warrant a consultation process, and DTI would be considered alongside other options and enhancements to the Dashboard.

11 See https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Policy-development/Banks/DTI/Consultation-paper-DTIs-June-2017.pdf.

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